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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,672	01/24/2004	Fusao Ishii	Fishii004	9096

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EXAMINER

TRA, TUYEN Q

ART UNIT PAPER NUMBER

2873

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/763,672

Applicant(s)

ISHII ET AL.

Examiner

Tuyen Q. Tra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0104.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

1. The declaration filed 07/03/05 is acceptable.

Drawings

2. The drawings 01/24/2004 in this application are accepted.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-10 recites the limitation "the angle", "the layer that contains the reflecting element" in line 1. There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 102

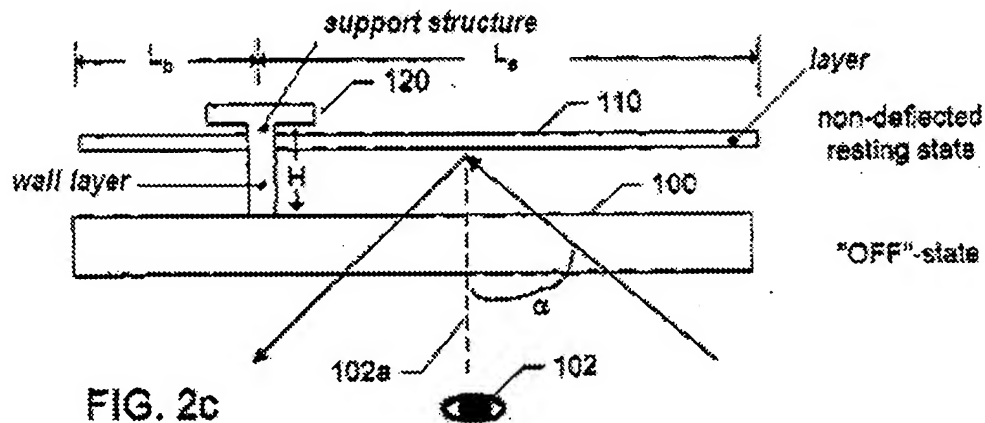
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2, 5-10 and 19-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Patel et al. (U.S. Pat. 6,885,494 B2).

a) With respect to claim 1, 2, 5 and 6, Patel et al. discloses a high angle micromirror and processes in Figure 2C comprising of a reflecting element (item 110) that can be deflected into at least 2 states (OFF and ON states), and a support structure (not

numbered) for supporting the reflecting element (110), the support structure comprising at least 1 wall (see Fig. below); wherein the reflecting element comprises at least 1 metallic layer (for electrostatic attraction); wherein the reflective surface of the reflecting element (110) is substantially planar with neither depressions nor protrusions, wherein the reflective surface of the reflecting element has no outer edges that are perpendicular to the projection of the incident light propagation vector onto the plane of the reflective surface (110).



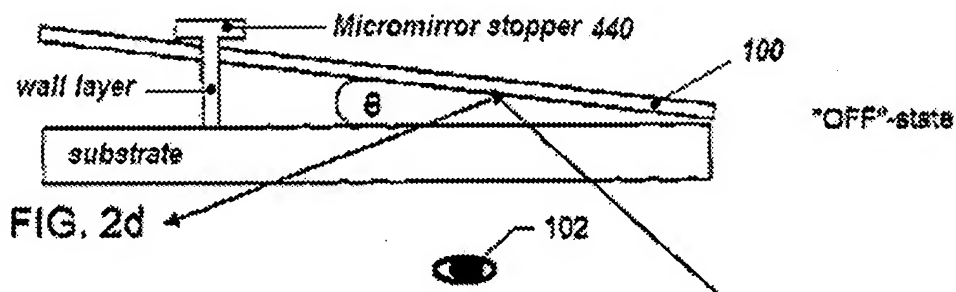
b) With respect to claims 7-10, Patel et al. further discloses wherein the at least 1 wall is oriented such that the angle between the projection of the incident light propagation vector onto the plane of the reflective surface of the reflecting element and a wall segment of the at least 1 wall is between 0° and 75° ; wherein the angle is between 0° and 60° ; wherein the angle is between 0° and 45° (col. 6, lines 8-12); wherein the at least 1 wall is contained in a layer that is separate from the layer that contains the reflecting element.

c) With respect to claim 19, Patel et al. discloses a high angle micromirror and processes in Figure 2D, 2E and 10 comprising of a reflecting element (item 100) that

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can be deflected into at least 2 states; a 1st support structure (item 440a) for supporting the reflecting element (100), the support structure comprising at least 1 wall; a torsion hinge (item 410) that is connected to the least support structure (440a, 440b), and a 2nd set of support structures (item 440b) for supporting the torsion hinge (410), the 2nd set of support structures defining an axis of rotation of the torsion hinge (410).

d) With respect to claims 20-27, Patel et al. further discloses wherein each of the 2nd set of support structures comprises at least 1 portion (mirror stopper) for limiting the deflection of the reflecting element; wherein the 2nd set of support structures comprises support structures selected from the group consisting of: triangular structures, polygonal structures, walls, elliptical structures, and circular structures; wherein the 2nd set of support structures comprises a material selected from the group consisting of: polycrystalline silicon, monocrystalline silicon, amorphous silicon, Al, Al alloy, Mo, W, TiSi₂, W Si₂, Co Si₂, Ti:W, TiN, and Cu.



e) With respect to claim 28, Patel et al. discloses a high angle micromirror and processes in Figure 2D, 2E and 10 comprising of a reflecting element (item 100) that can be deflected into at least 2 states; a 1st support structure (item 440a) for supporting the reflecting element (100), the support structure comprising at least 1 wall; a deformable element (item 410) that is connected to the 1st support structure (440a,

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440b), a 2nd set of support structures (item 440b) for supporting the deformable element (410); and a base layer (substrate layer) for supporting the 2nd set of support structure (440b), the base layer having a 1st surface (top surface) and a 2nd surface (bottom surface), with the 1st surface facing the reflecting element.

f) With respect to claims 29-35, Patel et al. further discloses wherein the base layer comprises a crystalline semiconductor material; wherein the crystalline semiconductor material is selected from the group consisting of polycrystalline silicon and monocrystalline silicon; wherein the base layer additionally comprises addressing electrodes for actuating the reflecting element; wherein the base layer additionally comprises addressing electrodes for actuating the deformable element; wherein the base layer additionally comprises control circuitry; wherein the control circuitry is disposed on the 1st surface of the base layer.

g) With respect to claim 36, Patel et al. further discloses wherein the control circuitry is selected from the group consisting of: CMOS circuits, NMOS circuits, PMOS circuits, bipolar transistor circuits, BiCMOS circuits, DMOS circuits, HEMT circuits, amorphous silicon thin film transistor circuits, polysilicon thin film transistor circuits, SiGe transistor circuits, Sic transistor circuits, GaN transistor circuits, GaAs transistor circuits, InP transistor circuits, Cdse transistor circuits, organic transistor circuits, and conjugated polymer transistor circuits.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Hornbeck (U.S. Pat. 5,061,049 A).

Hornbeck discloses a spatial light modulator and method in Figure 1A comprising of a reflecting element (item 30) that can be deflected into at least 2 states; a support structure for supporting the reflecting element, the support structure comprising at least 1 wall (item 24); and a deformable element (item 36) that is connected to the support structure; wherein the deformable element (36) is a torsion hinge; wherein the deformable element comprises a crystalline semiconductor material; wherein the crystalline semiconductor material is selected from the group consisting of polycrystalline silicon and monocrystalline silicon; wherein the crystalline semiconductor material is doped.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (U.S. Pat. 6,885,494 B2), as applied to claim 1 above, in view of Min (US Patent 5,886,811 A).

Patel et al. discloses a high angle micromirror and processes in Figure 2C comprising of a reflecting element (item 110) that can be deflected into at least 2 states (OFF and ON states), and a support structure (not numbered) for supporting the reflecting element (110), the support structure comprising at least 1 wall. However, Patel et al. does not disclose wherein the support structure comprising at least 1 wall comprises a material selected from the group consisting of: polycrystalline silicon, mono-crystalline silicon, amorphous silicon, Al, Al alloy, Mo, W, TiSi₂, WSi₂, Co Si₂, Ti:W, TiN, and Cu. Within the same field of endeavor, Min discloses a thin film actuated micro-mirror array in an optical projection system and method for manufacturing the same with teaching of the wall (post) made for elastic material such as an aluminum alloy (col. 9, lines 49-59).

It would have been obvious, therefore, at the time the invention was made to a person having skill in the art to construct optical device with a post (wall) such as disclosed by Patel et al., and with the wall made of Aluminum alloy material such as discloses by Min, for purpose of supporting the mirror.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (U.S. Pat. 6,885,494 B2), as applied to claim 1 above, in view of Patel et al. (U.S. Patent 6,867,897 B1).

Patel et al. discloses a high angle micro-mirror and processes in Figure 2C comprising of a reflecting element (item 110) that can be deflected into at least 2 states (OFF and ON states), and a support structure (not numbered) for supporting the reflecting element (110), the support structure comprising at least 1 wall. However,

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Patel et al. does not disclose a semiconductor layer of mirror. Within the same field of endeavor, Patel et al. 897' discloses a micromirror and off-diagonal hinge structures for micromirror arrays in projection displays comprising of micro-mirror array with teaching a semiconductor (silicon dioxide) layer (col.1, lines 53-54).

It would have been obvious, therefore, at the time the invention was made to a person having skill in the art to construct optical device with micro-mirrors (48) such as disclosed by Patel et al. ('494), and with the a semiconductor (silicon dioxide) layers in mirrors such as discloses by Patel et al. ('497), for purpose of insulating the mirror.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (U.S. Pat. 6,885,494 B2), as applied to claim 1 above, in view of Huibers (U.S. Patent 6,356,378 B1).

Patel et al. discloses a high angle micro-mirror and processes in Figure 2C comprising of a reflecting element (item 110) that can be deflected into at least 2 states (OFF and ON states), and a support structure (not numbered) for supporting the reflecting element (110), the support structure comprising at least 1 wall. However, Patel et al. does not disclose a plurality of dielectric layers. Within the same field of endeavor, Huibers discloses a double substrate reflective spatial light modulator comprising of micro-mirror array with teaching a plurality of dielectric mirror layers (items 70,72, Fig. 2F).

It would have been obvious, therefore, at the time the invention was made to a person having skill in the art to construct optical device with micro-mirrors (48) such as

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disclosed by Patel et al., and with the a plurality of dielectric layers in mirrors such as discloses by Huibers, for purpose of insulating the mirror.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuyen Tra whose telephone number is (571) 272-2343. The examiner can normally be reached on Monday to Thursday from 8:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps, can be reached on (571) 272 - 2328. The fax number for this Group is (703) 872-9306.

tt

May 15, 2005


Hung Xuan Dang
Primary Examiner